

Implementing
the National Oceanic and Atmospheric Administration's
**Mandate to Engage Coastal Users:
Opportunities for National Sea Grant
Outreach Growth**

**Sea Grant Outreach Growth Committee
National Sea Grant College Program**

February 2003

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Corvallis, Oregon
ORESU-Q-03-002

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This publication was funded by the National Sea Grant College Program of the U.S. Department of Commerce's National Oceanic and Atmospheric Administration, under NOAA grant number NA16RG1039 (project number A/ESG-5), and by appropriations made by the Oregon State legislature.



OREGON STATE UNIVERSITY

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SUMMARY

The National Sea Grant College Program is a nationwide network of 30 university-based programs supported by the National Oceanic and Atmospheric Administration (NOAA), a division of the U.S. Department of Commerce.

Federal funds are matched with funds from state, tribal, business, and other nonfederal sources to carry out programs on a local, state, regional, and national level. Sea Grant research and outreach programs promote better understanding, conservation, and use of America's coastal resources.

As America's coastal areas grow in economic and social importance, their vulnerability moves to the forefront of concern for all Americans. Pressures from a growing coastal population have placed great demands on the coastal environment. Further changes must be anticipated and buffered to sustain these national food and water resources. Over half of the U.S. population lives within coastal counties, and taxes generated in coastal areas are among the fastest-growing sources of revenue for local, state, and federal governments. Many programs and agencies—federal, state, and local—are trying to address such impacts, but none have the resources to tackle them alone.

Over the past three decades, the 30 Sea Grant programs have developed a highly regarded, university-based network conducting nonadvocacy outreach on critical coastal issues. They have helped stakeholders and policymakers in their areas to understand and meet coastal challenges within the limitations of level funding. For many of those years, Sea Grant has been part of NOAA.

In the past two decades, Congress has greatly expanded NOAA's responsibilities for coastal issues without significant budget increases. NOAA and Sea Grant have had to scale back some important but lower-priority activities while responding to intensified demand for expanded outreach on complex coastal activities and issues. States and local sources have assumed an increasing financial burden, often resulting in little or no progress toward coastal sustainability. Meeting the challenges of coastal issues requires greater outreach effort, and that necessitates additional federal support.

In response to one of the suggestions in the Byrne Report, *A Mandate to Engage Coastal Users*, the Assembly of Sea Grant Extension Leaders established a Growth Committee in March 2002, subsequently joined by Sea Grant's National Communications Network and the Sea Grant Educators Network. This committee was charged with critically looking at opportunities to develop or expand Sea Grant outreach, using thinking that had already been prioritized by the Sea Grant Theme Teams and other Sea Grant groups. The goal of this outreach would be to deliver the information and tools that are needed by many coastal user groups to better understand, anticipate, and respond to change. The committee selected seven issues outlined below from among the many currently facing coastal America:

1. Climate extension: a NOAA partnership
2. SmartPorts: a partnership with NOS
3. Environmental literacy: a national campaign
4. Seafood science and safety: increasing effectiveness

5. Sustainable coastal communities: outreach for coastal America
6. Fisheries management: improving fisher-manager partnerships
7. Ocean observations: developing an outreach network

On the following pages, a blueprint for Sea Grant outreach planning is described. It includes Sea Grant's best recommendations for outreach to sustain some of the most valuable and vulnerable areas of our nation. Each outreach opportunity is briefly described and the partners and federal resources necessary to achieve new outreach objectives are identified,

although exact cost estimates for each outreach initiative depend on specific work plans.

BACKGROUND

The magnitude of America's coastal problems and their economic impacts is staggering. National coastal and ocean resources encompass more than 95,000 miles of coastline and more than 3.4 million square miles of ocean within the U.S. territorial sea. Over half of the U.S. population lives within coastal counties, and taxes generated in coastal areas are among the fastest-growing sources of revenue for local, state, and federal governments. Many agencies—federal, state, and local—are trying to anticipate and address impacts on this vulnerable area but none have the resources to tackle them alone.

Sea Grant has provided excellent research and outreach services to the United States since it was established by the National Sea Grant and Program Act of 1966. The act called for a network of sea grant colleges that would conduct research, training, and education activities in all fields of marine resources. More specifically, the act called for programs consisting of “instruction, practical demonstration, publications, and otherwise . . . with the object of imparting useful information to persons currently employed or interested in various fields related to the development of marine (and coastal) resources, the scientific community, and the general public.” Sea Grant defines outreach as the transfer of science-based information to a diverse clientele that includes commercial and recreational fishers, coastal businesses, governmental entities, environmental organizations, K–12 students and teachers, and coastal residents. An issue-oriented, problem-solving process, using research findings, is applied through partnerships with stakeholders.

For nearly four decades, the National Sea Grant College Program has operated a nationwide network of unified, highly regarded, university-based outreach professionals. Currently, the National Sea Grant Program invests more than \$16 million in federal resources to support approximately 400 outreach professionals conducting outreach projects through a network of 30 Sea Grant programs in nearly all coastal and Great Lakes states. Sea Grant legislation requires cost sharing (50 percent) from nonfederal sources (exceeded in most states), which has fostered the formation of multiple partnerships at the state and local levels and resulted in a highly leveraged federal investment.

Congress has greatly expanded NOAA's responsibilities in the last two decades, and as with Sea Grant, these additional demands have not been accompanied by significant budget increases. NOAA has had to scale back, cancel, or postpone other important but lower-priority activities while responding to an intensified demand for expanded outreach on complex coastal activities and issues, ranging from fishing to community development and from natural hazards to pollution.

THE CASE FOR SEA GRANT OUTREACH

The economic, environmental, and social demands on our coastal oceans and shorelines will be unparalleled in human history, and these demands will be similar throughout the world. The need for solutions to coastal problems, resolution of conflicts, and help in general will continue to grow as threats to coastal areas increase.

A Mandate to Engage Coastal Users
November 2000

In November 2000, former NOAA Administrator Dr. John V. Byrne, on behalf of an eight-member Sea Grant Extension Review Panel, submitted a report to the National Sea Grant Office (NSGO) titled *A Mandate to Engage Coastal Users* (Byrne Report). The report reviewed the Sea Grant Extension Program, and the panel's conclusions provided the Sea Grant network with 20 recommendations to better fulfill its outreach potential in the early 21st century.

In response to one of the Byrne Report's suggestions, the Assembly of Sea Grant Extension Leaders established a Growth Committee in March 2002. Sea Grant's National Communications Network and the Sea Grant Educators Network have joined the Growth Committee since that time. This committee of Sea Grant faculty, directors, associate directors, extension leaders, educators, and communications professionals was charged with identifying opportunities to deliver the information and tools needed by many coastal user groups to better understand, anticipate, and respond to change.

NOAA is also identifying priorities for action. In its recently released draft strategic plan for FY 2003–2008, "New Priorities for the 21st Century," the agency identified the areas of climate change, freshwater supply, ecosystem management, and homeland security. It also identified six crosscutting priorities for the same period, including environmental literacy, outreach, and education.

As the issues become more complex and the science underlying coastal and ocean management grows, the outreach challenge becomes more complex as well. Outreach must help stakeholders in a coordinated manner, and on national and regional as well as state and local levels. Professional outreach personnel will be needed more than ever to help citizens understand, anticipate, and respond to coastal and ocean issues and changes. Sea Grant's outreach network is particularly well positioned to be the conduit between information providers and users. Its greatest asset may be the trust it has nurtured through 30 years as an honest broker of information and technology.

For this group of professionals to deliver the level of outreach needed, additional federal funding is required. These highly trained academic professionals have expertise in numerous disciplines, enabling them to effectively develop and conduct a plethora of educational projects to deal with issues in the coastal regions. Sea Grant's outreach professionals have received specific training in effective communications, K–12 education, conflict resolution, and ways to develop and deliver objective, science-based information.

The collective economic impact of coastal America on the U.S. economy is growing rapidly. Although Sea Grant is one of the principal federal programs designed specifically

to address coastal research, outreach, and educational issues, it is approximately 1/50th the size of its counterpart and partner, the United States Department of Agriculture's Cooperative Extension Service. In the 2002 National Sea Grant College Program reauthorization bill, Congress identified the need to significantly increase Sea Grant's size by authorizing substantially greater spending limits.

Sea Grant's outreach network is ready to help the nation address the growing challenges to coastal regions. After reviewing Sea Grant's Theme Team documents, Sea Grant's Strategic Plan 1995–2005, NOAA's 2002 Program Review Report and draft Strategic Plan for 2003–2008, the Byrne Report, and other relevant documents, the committee identified some opportunities for Sea Grant to support national outreach challenges and, in the process, grow. In each case, Sea Grant has something to contribute to help people understand and meet some coastal and marine challenges. These opportunities can result in

- fostering sustainable urban coastal development through information and education
- protecting the health of Americans by developing new effective seafood safety programs
- developing an outreach infrastructure on longer-term climate patterns dealing with climate variability and extreme climate events in our coastal regions
- increasing U.S. environmental literacy through expanded outreach initiatives
- improving coastal resource decision making by promoting the use of information derived from new technologies, such as geospatial and ocean observations
- ensuring sustainable fisheries by providing science-based information and education to recreational and commercial fisheries stakeholders
- supporting the Marine Transportation System by providing information on security, safety, development, and environmental issues

For such results, financial resources will be needed. Although some general estimates are provided for each one, actual costs will depend on the specific work plan. Although the implementation costs of a strong national outreach program addressing these identified issues will differ according to some basic elements of suggested outreach growth and the finalized work plan, all of them will necessitate increased funds for outreach personnel at the state program level. Therefore, the estimated costs described in the following sections include approximately \$150,000 for each of the 30 Sea Grant programs (or about \$4.5 million) to cover that common need. In many cases, research needs are likely to emerge as stakeholders seek to increase their knowledge and understanding while attempting to meet the challenges.

Sea Grant outreach is always accompanied by evaluation procedures, which will be developed for each of the issue areas during action planning. Specific goals and milestones will be set that would be evaluated annually once initiated. Evaluations to determine cost savings, as well as the economic, social, and environmental benefits from Sea Grant outreach programming, are integral to the evaluation process.

The Growth Committee selected seven issues from among the many currently facing coastal America. Each of them is outlined in the "Opportunities for Sea Grant Outreach Growth" section of this document. They are

- climate extension: a NOAA partnership
- SmartPorts: a partnership with NOS
- environmental literacy: a national campaign
- seafood science and safety: increasing our effort
- sustainable coastal communities: outreach for coastal America
- fisheries management: improving partnerships between fishers and managers
- ocean observations: an outreach network

The committee developing this document noted numerous outreach areas within Sea Grant's purview that are worthy candidates for growth. It chose the seven issues described in the next section because they are associated with current high-priority issues within Sea Grant and NOAA as well as high-priority needs within the nation's coastal communities. However, this committee does not recommend that Sea Grant growth be limited to the areas described in this document.

OPPORTUNITIES FOR SEA GRANT OUTREACH GROWTH

Climate Extension: A NOAA Partnership

National Issue

Climate variability and change are major topics of discussion among policymakers and the focus of many of the world's scientists. NOAA has identified climate change as a new priority for action in its strategic plan for FY 2003–2008. On an international scale, research findings are compiled and assessed by groups such as the International Panel on Climate Change. Climate variability and change can significantly influence the health, prosperity, and well-being of all Americans, as demonstrated by recent high-impact natural events. Examples are Hurricane Andrew in 1992, Tropical Storm Allison in 2001, the 1997–98 El Niño event, and droughts, including the 1998 drought in Texas, the Northeast drought in 1999, and the 2002 drought conditions throughout much of the nation, with the resulting low water levels in the Great Lakes.

Sea Grant outreach can deliver the information and analytical tools needed by marine and coastal users to anticipate and respond to sudden and long-term ocean and coastal climatic events and trends. This information needs to be tailored to meet the needs of regional and local user groups.

Over the past decade, there have been significant advances in understanding longer-term climate patterns that influence these events. Increasingly, attention is being paid to the cumulative impacts of regional climate events on the interseasonal and decadal scale. Research on climate prediction and forecasting is continually improving to allow for application on these regional and local scales, with some measure of success. Much of this knowledge, and the associated analytical tools and predictive models, rests within various new NOAA units and their cooperators. These NOAA units include the Climate Observations and Services Programs, the Office of Global Programs Regional Integrated Sciences and Assessments Program, and the National Weather Service Climate Services Division. Each of these NOAA units possesses excellent research and technical capabilities. The outreach capacities to share information and tools exist in abundance within the National Sea Grant College Program.

Sea Grant Experience

Climate change is a relatively new issue throughout the world, but Sea Grant has been on the leading edge of outreach programming regarding this issue. In 1990, Washington Sea Grant coordinated one of the first regional symposiums on the topic. Subsequently, a number of regional and national training programs were conducted in the mid-1990s by individual Sea Grant programs. Funded largely by the National Science Foundation and United States Department of Agriculture, training workshops and materials reached at least 10,000 teachers (and 1,500,000 students) through national, state, and regional workshops

and seminars. During this timeframe, several Sea Grant outreach staff also participated in NOAA strategic planning efforts on climate change outreach. Sea Grant was identified as a vehicle for “climate extension activities.” However, these plans were never implemented because of changes in funding priorities within NOAA.

Most recently, coastal hazards were identified as one of Sea Grant’s primary themes for both research and outreach throughout the network. A partnership between NOAA’s climate research expertise and infrastructure and Sea Grant’s outreach expertise and infrastructure would create a regionally coordinated, constituent-based climate extension program. This partnership would increase use of NOAA climate research and analytical tools by targeted marine and coastal users at the local, state, and regional levels.

Objectives and Outcomes

Together, Sea Grant and NOAA’s climate research community can develop a comprehensive, long-term climate educational outreach and constituent service. This partnership can combine Sea Grant’s outreach, client-oriented infrastructure with the scientific expertise of NOAA researchers and its cooperators. The partnership’s objectives include the following:

- Defining and communicating current climate research, analytical tools, and products that are relevant to regional and local constituencies
- Providing NOAA units with a greater understanding of constituents’ needs and concerns
- Facilitating workshops, seminars, and forums to ensure that marine and coastal constituents understand technical issues and begin to use analytical tools and predictive models in their decision making
- Designing outreach strategies and products based on both stakeholder views and valid scientific studies
- Providing opportunities for communication and partnership between NOAA researchers and university-based scientists

The outcomes of such a partnership will be better communication between stakeholders and policymakers and improved understanding by constituents of the utility of analytical tools and predictive models of climate science that address relevant marine and coastal problems and issues. The partners will receive more effective feedback from stakeholders on research and education needs. The initiative will provide NOAA with an identified and unified extension/outreach capability in each region and enhance the existing extension capabilities of the 30 Sea Grant programs. Formal planning on a broader level can result.

Benefits to the Nation

The partnership can result in significant benefits to the nation:

- Sea Grant extension agents will provide improved information feedback from stakeholders to NOAA climate scientists regarding new research, management, and education needs.

- There will be greater involvement between NOAA and Sea Grant programs at a local level.
- Over the long term, science-based climate change information will be sought and used by community leaders, agriculture, and industry for decision-making on coastal matters.

Implementation Needs

To succeed, this national outreach opportunity must establish working relationships between NOAA's Office of Global Programs Regional Integrated Sciences and Assessments, the 30 Sea Grant programs, the National Weather Service's six regional climate centers, and various stakeholders. At the outset, it would be most effective to concentrate on Sea Grant programs in states with dense data and existing climate outreach activities (Washington, California, and Florida). In subsequent years, outreach would expand to the remaining 27. About \$6.15 million is needed to establish and support these relationships as well as to conduct workshops and to develop and distribute other outreach products necessary to implementing this work. Of that estimated cost, \$4.5 million would be needed for implementation by the 30 state programs.

SmartPorts: A Partnership with the National Ocean Service

National Issue

Our nation's commerce depends heavily on the U.S. Marine Transportation System (MTS). The MTS handles approximately 95 percent of all overseas U.S. foreign trade, representing approximately one billion metric tons, or 20 percent of the annual global ocean-borne trade. It is estimated that MTS contributes more than \$742 billion to the U.S. gross domestic product and creates employment for more than 13 million individuals.

The maritime system consists of waterways, ports and their intermodal connections, vessels, vehicles, manufacturing and repair facilities, information systems, and system users—an aggregate of state-, local-, and privately owned facilities in more than 1,000 harbor channels and 25,000 miles of inland, intracoastal, and coastal waterways. More than 300 ports and 3,700 terminals handling passenger and cargo movements are supported by intermodal connections consisting of 152,000 miles of rail, 460,000 miles of pipeline, and 45,000 miles of interstate highway. For policymakers, the MTS represents an economic, sociological, and ecological dilemma. Information and outreach support is essential for it and the many stakeholders associated with this immense and complex economic sector.

To help address MTS needs, the National Sea Grant Office funded a national ports and harbors specialist position within the Texas Sea Grant College Program in 2001. Sea Grant's initiative was complemented by NOAA's National Ocean Service (NOS) funds to support a similar position at the University of Southern California Sea Grant College Program. Both specialists are dedicated to assisting Sea Grant extension specialists and agents throughout the nation in developing outreach and educational programs for their ports, harbors, and waterways industry audiences. In addition, the ports and harbors specialists are building

the knowledge base of issues affecting the national ports and harbors system among other Sea Grant network components.

Almost simultaneously, NOS began to better coordinate intra-agency efforts to deal with port maintenance and development issues. It established the SmartPorts initiative within the NOS to address a number of critical MTS issues, including those related to port development, dredging and disposal, trade, security, safety, and the environment.

A distinct opportunity exists for increased collaboration between Sea Grant outreach professionals and NOS.

Sea Grant Experience

Historically, the National Sea Grant network has involved a diverse array of researchers and outreach personnel in ports and harbors issues. For example, between 1983 and 1999, an extension specialist from Washington Sea Grant worked with Sea Grant colleagues on port management and finance studies, presented at professional development courses (for example, the International Program for Port Planning and Management), and advised many members of the American Association of Port Authorities. More recently, the Sea Grant Urban Coasts Theme Team began to address some of the same critical issues as those within the focus of SmartPorts.

Sea Grant experts served on a Boston Harbor technical advisory group that recommended burying contaminated sediments in underwater trenches. This process is now used in similar projects throughout the United States. Around the country, port managers have called upon Sea Grant to help balance the need for infrastructure improvements and wetland preservation.

Sea Grant's well-known outreach on invasive species extends to the MTS through outreach and interaction with ports on all U.S. coasts, especially with a focus on reducing the transport of invasive species in vessel ballast. With NOAA, Sea Grant is actively involved in the ballast water outreach of the National Aquatic Nuisance Species Task Force, and many Sea Grant programs assisted in the development of the National Invasive Species Council Management Plan. Thus, the Sea Grant outreach network is well positioned to play a key role in assisting NOS as it pursues the SmartPorts initiative.

Objective and Outcomes

Sea Grant's national ports and harbors specialists can enhance the NOS SmartPorts initiative through outreach objectives to

- establish constructive relationships within the industry trade associations and ports
- identify issues within the national ports and harbors industry with a national focus for appropriate action by researchers and policymakers
- serve as an honest broker of educational outreach materials
- enhance the knowledge and capabilities of the National Sea Grant outreach network so that the local ports and harbors will be better served and the public will become better educated through unbiased information on ports and harbors issues

- work closely with all NOAA agencies with an interest in or jurisdiction over the MTS to develop outreach activities and identify opportunities in other government agencies also in need of ports and harbors outreach

Benefits to the Nation

Such a partnership can result in significant benefits to the nation:

- An efficient and progressive MTS, addressing economic, social, and environmental issues
- Conservation of the nation's quality of life as well as its security
- Timely and true outreach initiatives to ensure smart port development and use

Implementation Needs

To succeed, this national outreach must establish working relationships between the 30 Sea Grant programs, the NOS SmartPorts staff, port personnel, and other relevant coastal stakeholders. Although initial funds have been allocated through the National Sea Grant Office to support the national ports and harbors specialist and through the National Ocean Service for a similar specialist in Southern California, two additional specialists, located on the East Coast and the Great Lakes, are needed for a comprehensive national outreach program. Workshops, training, and interaction among these specialists and the Sea Grant personnel in all 30 Sea Grant programs would be intensive at the outset. About \$5.5 million will be needed to establish and support state program needs, the relationships listed above, and the workshops and other outreach products necessary to implement their work.

Environmental Literacy: A National Campaign

National Issue

Although the U.S. public adores its shorelines, relatively few people understand the complex ecological systems of ocean and Great Lakes waters, nor do most understand the economic role played by these coasts. Currently, 81 percent of Americans rely on mass media for environmental information. As greater demands are placed on our nation's coasts, the need for increased understanding about these matters is critical. Sea Grant is not alone in identifying this need. NOAA recently cited "environmental literacy" as one of four major agency goals and specifically emphasized this topic in its most recent strategic plan.

The nation's formal educators are addressing this need through K-12 curriculum development, the National Science Education Standards, and state science standards. The National Science Foundation's Centers for Ocean Science Education Excellence initiative, the National Oceanographic Partnership Program's Strategy for Ocean Science Education, and the National Marine Educator Association's recommendations to the U.S. Commission on Ocean Policy and the Pew Ocean Commission all point to this need. All of these formal education efforts should be supported and reinforced by informal education.

Currently underway are a variety of efforts at informal marine and coastal science literacy, such as the National Geographic Society's Sustainable Seas Expedition, NOAA's Office of Ocean Exploration, and the annual National Ocean Science Bowl. Sea Grant's grass-roots-based outreach network is focused on such efforts within individual states or regions, applying science-based knowledge to outreach on many coastal environmental issues in an unbiased and effective manner.

With this national outreach campaign, Sea Grant seeks to concentrate on coastal issues in a more technology-focused method than previously possible. The goal to increase environmental literacy in coastal areas around the United States can be achieved by capitalizing on existing and new partnerships to launch a national outreach campaign. Although NOAA and Sea Grant goals and objectives are at the heart of this outreach opportunity, it relies on advanced outreach technology to develop products, and it depends on a unified topic approach, linking formal and informal education. For example, a digital video series for K–12 classrooms on wetland habitat can be further explained through the World Wide Web, national broadcasts, and displays at aquaria and zoos. In all cases, advanced electronic technology would be used to achieve a more dynamic and memorable experience based on crucial coastal issues.

Collaboration with nationally respected partners and the use of advanced technology that engages people of all ages can improve informal education. Learning about coastal environmental issues in the leisure hours is successful and lasting because it is fun. Partners could include national television, radio and print media, the Smithsonian Institution, zoos and aquaria across the nation, the National Geographic Society, the National Science Foundation, and others.

Sea Grant Experience

Sea Grant's outreach network includes personnel dedicated specifically to formal and informal education on all levels. They are part of the larger Sea Grant network, linking youths and stakeholders with coastal and marine experts. Sea Grant outreach professionals have established relationships with a variety of coastal resource users and managers. All are known for distilling cutting-edge coastal science into terms that the general public understands and for helping coastal stakeholders and regulators work together to sustain the coastal environment. Sea Grant-sponsored research to provide science-based information to these outreach efforts is focused through the Education and Human Resources Theme Team.

Over the past eight years, more than 700 K–12 teachers have received Sea Grant's COAST: Operation Pathfinder training to increase their understanding of oceanography and improve teaching techniques. The Sea Grant outreach network also has many relationships with the nation's informal educational media, such as television and newspapers, museums, zoos, and aquaria. For example, University of Southern California Sea Grant participated in the Center for Ocean Science Excellence in Education funded by the National Science Foundation; Texas Sea Grant participated with The National Marine Fisheries Service and the Moody Aquarium in developing aquarium displays on coastal fishes; North Carolina Sea Grant's collaboration with the state's aquariums, the National Undersea Research Program, and NOAA's Office of Ocean Exploration resulted in teacher workshops;

and Oregon Sea Grant worked with the Hatfield Marine Science Center to develop educational displays. Illinois-Indiana Sea Grant's Zebra Mussel Mania Traveling Trunks have been used for the past six years to support the environmental literacy efforts of more than 13,000 teachers and students and 38 aquariums, zoos, and nature centers.

When these partnerships select coastal and marine topics within state and national science standards that have already been identified by education professionals, they provide informal reinforcement for youngsters and involve adults in topics familiar to youth. Adding cutting-edge outreach technology to well-recognized coastal and marine topics and issues leverages the impact of each educational experience.

Objectives and Outcomes

Sea Grant and national partners can increase environmental literacy by

- using interactive, multimedia outreach technologies and experts to maximize the educational impact
- designing coordinated national outreach projects
- including topics already identified in national K–12 standards and curricula
- working with national leadership of traditionally local partners, such as aquaria, zoos, libraries, museums, and science centers
- working with the national broadcast and print media to identify topics and approaches for reaching the general public

Benefits to the Nation

One of the greatest dilemmas encountered by policymakers on coastal issues is diverse public opinion, or worse, no public opinion. National outreach partnerships to achieve environmental literacy can result in

- similar understanding of ocean systems among all ages and regions
- increased understanding of the nation's coastal and marine resources
- increased interest in sustaining America's coasts

Implementation Needs

To succeed, this national outreach must raise state and local partnerships to a national level and integrate coastal and marine formal educational goals with informal outreach products. Leading-edge technology is the best tool to achieve such integration because it is designed to actively engage audiences on a variety of levels in formal and informal settings. This initiative must establish national working relationships among the 30 Sea Grant programs, national science education associations, and national recreation-oriented educational forums such as zoos and aquaria. To fund experts in such technology plus additional Sea Grant outreach personnel, establish and maintain the needed working relationships over the long term, and disseminate coastal and marine information through traditional as well as new distribution methods will require an estimated \$8.5 million. Of that estimated cost, \$4.5 million would be needed for this outreach by the 30 state programs, while the balance would fund development of outreach products using advanced technologies.

Seafood Science and Safety: Increasing Effectiveness

National Issue

The seafood industry—the oldest traditional coastal resource use—faces many challenges and opportunities in the 21st century. On the one hand, the \$27 billion industry is faced with declining stocks, strict safety and environmental regulations, an increasingly competitive global marketplace, and rising costs. On the other hand, the demand for high-quality seafood has never been higher. The changing face of the seafood industry brings new opportunities for expanding markets, forming strategic alliances, and advancing innovations to lower production costs, create new products, add value to existing ones, increase safety, and reduce waste.

Although Sea Grant's seafood technology infrastructure is smaller today than in previous years, it represents one of the major components of many Sea Grant programs. This smaller base means there are fewer qualified research and outreach personnel to develop programs to meet coastal and industry needs. The seafood industry, which is composed of mostly small and medium-sized, independent enterprises, recognizes the benefits of innovation although it simply cannot afford research and development programs. Returning Sea Grant seafood technology outreach to its earlier level can strengthen the science base of the U.S. seafood industry in facing current and future challenges. With additional resources, Sea Grant's 30 years of seafood outreach experience can be used to train the next generation of seafood professionals. Partners, focused on specific seafood and safety topics, can enhance this outreach foundation.

Sea Grant Experience

Early on, Sea Grant's attention to fisheries issues led naturally to America's seafood industry. University-employed outreach professionals have been assisting constituents in applying complex scientific information to solve processing and production problems, and, conversely, have been communicating constituents' needs for research and information to scientists and managers. For example, to enable the seafood industry to comply with federal food-safety regulations, Sea Grant created a partnership with the industry and government. The National Seafood Hazard Analysis and Critical Control Point (HACCP) Alliance has already trained 90 percent of the nation's seafood processors in compliance techniques, making the products safer for consumers and business better for the industry. Sea Grant's outreach through Sea Grant aquaculture, biotechnology, fisheries, and ecosystems and habitats theme teams includes seafood-related issues and audiences.

After the Sea Grant outreach network also identified sources and controls for the human pathogen *Listeria monocytogenes*, Atlantic crab processors were able to comply with federal and state regulators and meet the needs of commercial buyers—a \$3.7 million value annually. Processing plants in Alaska, Washington, and Oregon are saving over \$1 million annually in reduced energy consumption, reduced waste, and increased productivity. The Sea Grant seafood technology outreach community is uniquely positioned to promote the sustainability of the nation's seafood industry.

Objectives and Outcomes

Using science-based information, the Sea Grant outreach community in various appropriate partnerships can concentrate on two main issues—ensuring seafood safety for the consumer and helping business prosper. For example, safety programming will encompass activities such as assisting the FDA in developing appropriate regulations, helping businesses comply with FDA regulations, educating consumers about buying and preparing seafood, educating industry workers about handling and sanitation, and developing improved processing procedures.

Specific objectives include the following:

- Ensuring the safety of seafood by facilitating information exchange, thus enabling industry to comply with new regulations
- Ensuring the quality of seafood by facilitating information exchange on new technologies to enhance quality, detect decomposition, and extend shelf life, while adding minimal costs
- Improving seafood processing technology by demonstrating new technologies at processing plants that illustrate opportunities for conservation of raw materials and other costly resources, such as energy, water, labor, and waterfront space
- Expanding supplies and markets for seafood by increasing international collaborations to provide opportunities for the U.S. industry to learn and adapt foreign technologies to the U.S. setting
- Continuing training for individuals in the industry on Hazard Analysis and Critical Control Points, research findings, and seafood-related human pathogens
- Increasing industry productivity through outreach on best management practices

Benefits to the Nation

Sea Grant outreach on seafood science and safety can provide the following for policy-makers:

- Assurance that the seafood consumer has safer, more-nutritious and higher-quality seafood supplies
- Increased competitiveness for the U.S. seafood industry in the global market
- Environmental improvements in our nation's waterways because of improved by-product recovery and more efficient use of aquatic resources

Implementation Needs

An enhanced seafood technology program can be achieved by rebuilding Sea Grant's university-based seafood technology infrastructure and disseminating information nationally. In addition to an investment of about \$150,000 for seafood technology outreach in each state Sea Grant program (a total of \$4.5 million), approximately \$3 million would be needed to cover the costs of outreach products.

Sustainable Coastal Communities: Outreach for Coastal America

National Issue

One in every six U.S. jobs is coastal or marine related and one-third of the nation's gross domestic product is based in coastal areas through fishing, maritime transportation, recreation and tourism, and other industries. Of these areas, coastal tourism and recreation are among the largest and fastest-growing economic segments of the U.S. service industry, totaling over \$58 billion in sales annually. Approximately 85 percent of all U.S. tourism revenues are generated by the coastal states.

Healthy aquatic and terrestrial environments not only are essential for these economic sectors, but they also help attract residential development by offering a high quality of life. As a result, over 50 percent of the U.S. population resides within 50 miles of a marine or Great Lakes coast, and 3,600 people relocate to U.S. coastal communities daily.

Rapidly growing coastal populations and demands for access to the coast have a downside. Since the 1970s, the demands on the environment have transformed and degraded coastal habitats, polluted coastal waters, and significantly altered the biological and chemical functions of those coastal environments. Such loss of habitat, the increased occurrence of harmful algal blooms, and the closure of swimming waters and shellfish beds have diminished the social vitality and economic well-being of some coastal communities and economies. The rapid, pervasive development of America's coasts has also increased the potential magnitude and impact of hurricanes, floods, and tsunamis, threatening coastal resources and productivity. Most recently, homeland security imperatives are stimulating fundamental change in maritime transportation, energy, and other coastal facilities and infrastructures. There is a growing imperative in America to enhance the efforts of municipalities, counties, and states to foster sustainable coastal communities, environments, and economies. Sea Grant's strong outreach in these communities continues to be needed.

Sea Grant Experience

Since its inception, Sea Grant has worked with coastal communities, investing energy in their people and resources, and since the 1980s, Sea Grant has targeted growth management and sustainable development issues. In recent years, the Nonpoint Education for Municipal Officials program has helped local officials manage their communities while sustaining their waters, and Sea Grant's Coastal Communities and Economies Theme Team assessed coastal communities' needs on a national scale.

In 2000, the National Sea Grant Office launched the Coastal Community Development Program (CCDP). This national initiative provides science-based information, technical assistance, and educational products to facilitate the efforts of municipalities, counties, state agencies, and watershed management districts, as well as community planners, elected officials, zoning administrators, local agencies, and industry groups to achieve sustainable coastal community development.

To implement the CCDP, the National Sea Grant Office added \$50,000 to the annual core budget of each state Sea Grant program. Sea Grant programs are using these funds within their states to support CCDP coordinators and develop and implement projects in outreach, education, and research. The CCDP represents Sea Grant's commitment to

provide science-based support and guidance to those working to balance the complex environmental, social, and economic considerations unique to coastal communities. This very modest national investment is already enabling the state Sea Grant programs to build capacity and establish new partnerships with public and private organizations concerned about sustainability. With its partners, the CCDP is already using outreach to stimulate research and local management, addressing coastal urban ecology, land use, resource economics, policy and legal studies, mapping and geographic information systems, coastal processes, and natural hazards. This centralized project offers a central clearinghouse for issues and multiple links to stakeholders for policymakers, but more resources are needed to provide the necessary support.

Objectives and Outcomes

The CCDP's long-term outreach objectives include

- identifying and promoting understanding of the scientific, technical, and educational issues critical to achieving sustainability and eliminating the negative consequences of coastal sprawl
- facilitating stakeholder collaboration to identify and address these crosscutting issues
- articulating the scientific and technical needs of state, regional, and local decision makers and stakeholders, and addressing them through national, regional, and state research and education portfolios
- supporting appropriate state-based Nonpoint Education for Municipal Officials programs to help local decision makers successfully address the relationship between land use and natural resource protection, with an emphasis on water resources
- educating local decision makers, businesses, and the public about the socioeconomic benefits of practicing growth management and enhancing local planning capabilities
- providing expertise to evaluate coastal development policies with regard to balancing sustainable resource protection, economic development, compliance with state and local regulations, and user conflicts

Benefits to the Nation

As results and insights grow, the CCDP provides an ongoing framework to plan for and implement future outreach dedicated to achieving sustainable ecosystems and economies for America's coastal communities. These benefits include

- enhanced capacities for local and regional planning and coordination and resource management
- collaborative stakeholder processes that enable public and private entities
- documentation on substantial tangible and intangible benefits of managing growth and directing economic development in coastal communities
- greater appreciation and support for sustainable development and growth management within America's coastal communities

Implementation Needs

Sea Grant's initial national investment in the CCDP was a modest beginning. To nurture this investment, Sea Grant must extend its outreach and coordinate it nationally and regionally. Furthermore, the relationship of these individual projects must be deeply coordinated. Stakeholder understanding of coastal community issues and involvement in their care requires an additional \$400,000 annually for each of the 30 Sea Grant programs (about \$12 million) to be earmarked for the CCDP program and approximately \$2 million to fund regional coordination and outreach. Exact figures depend on the eventual plan of work. As the outreach program achieves some success, additional research dollars may be sought to sustain the dedication to and interest in the ocean stimulated among stakeholders.

Fisheries Management: Improving Partnerships between Fishers and Managers

National Issue

In recent years, the scientific and regulatory responsibilities of various state, regional, and federal fisheries management agencies, including The National Marine Fisheries Service, have increased significantly. This has resulted in an increased need to foster understanding and partnerships between fishers and scientists; to provide timely information that may affect fishing communities, as well as industries; to develop public education and outreach programs that provide easy access to fisheries management agencies; and to foster an understanding of the National Marine Fisheries Service's activities and mission. At present, there is an identified need to provide a workforce and infrastructure dedicated to developing outreach programs and building understanding between regulators, scientists, constituents, and the general public. The Sea Grant Extension Program possesses the expertise to provide a dedicated and structured joint program among fisheries management agencies. Thus, Sea Grant can develop a regionally coordinated, constituent-based fisheries extension program through increased use of science and management information provided by fisheries management agencies. This information will be used at the local, state, and regional levels to better serve fishing communities.

Sea Grant Experience

Sea Grant's outreach capability and reputation as an honest broker, especially between regulators and stakeholders, was built on its work with fisheries. For example, Sea Grant outreach on the issues surrounding the use of turtle excluder devices and bycatch reduction devices helped with their adoption and adaptation. Disseminating the results of numerous studies on population dynamics and recruitment of popular commercial species helped regulators and fishers make sound decisions. Most recently, most state Sea Grant programs have assumed responsibility for enhancing fisheries outreach locally by addressing pressing problems at the dock.

Nearly 27 percent, or \$5.4 million, of the FY 2000 Sea Grant Extension core budget (which includes both the federal and state portions) was devoted to the "Seafood Produc-

tion” category identified in the 1995–2005 Strategic Plan. This category accounted for 29 percent of the same budget in 1995. “Seafood Production” comprises three subcategories: revitalizing the nation’s commercial fisheries, developing sustainable U.S. aquaculture, and enhancing the competitiveness of U.S. fisheries through advances in seafood technology.

Objectives and Outcomes

Through new partnerships with the fisheries management community, the Sea Grant fisheries outreach can develop a more comprehensive long-term outreach and constituent service than currently exists within any single agency or program. This fisheries outreach partnership will strive to

- define and communicate the long-term strategies for managing U.S. marine fisheries to relevant constituencies
- facilitate workshops, seminars, and forums to ensure that fishers and other constituents understand the technical issues and analytical tools of fisheries management, including scientific stock assessment methods, biologically based management strategies, and predictive models, and that management agencies better understand constituents’ needs and concerns
- improve understanding among fisheries managers of the socioeconomic impacts of fisheries management and of fishing community responses to different management approaches
- foster direct communication programs between fisheries management personnel and fishing constituents to design holistic fisheries management strategies based on both stakeholder views and valid scientific studies
- encourage partnerships with fishers, fisheries managers, and university-based scientists in cooperative research activities
- enhance coordination and information exchange among federal and state agencies, regional management, and other affected constituencies (for example, recreational anglers, aquaculturists, land-use planners)

This initiative will result in better communication with constituents and improved understanding by constituents of fisheries science, management, regulatory actions, and other relevant issues. The constituent image of The National Marine Fisheries Service and regional fisheries management agencies can improve, resulting in reduced tensions and increased cooperation. Because such outreach would be national in scope, it can provide for a more effective exchange between everyone associated with America’s fisheries and provide policymakers with a better understanding of fishers’ concerns. A coordinating group in each region may emerge to develop programmatic themes, coordinate activities, determine priorities, and provide general oversight to the extension activities.

Benefits to the Nation

A joint outreach program involving fisheries management agencies will provide

- greater involvement at the local level, thus building on over three decades of Sea Grant experience in stakeholder-driven outreach
- more informed and receptive fisheries constituency

- a coordinated process for interacting with constituents
- more effective and efficient access for all to fisheries science and management information
- improved ability to address problems on a regional basis

Implementation Needs

National outreach in fisheries management requires strong, developed relationships with state and federal fisheries agencies, regional fishery management councils, interstate fisheries commissions, and industry stakeholders. To ensure that the relationships are sustained on a national and regional as well as state level, each state Sea Grant program will need about \$150,000 for fishery outreach (a total of \$4.5 million for 30 programs). As the outreach program achieves some success, additional research dollars may be sought to sustain the interest in dedication to the ocean stimulated among stakeholders.

Ocean Observations: An Outreach Network

National Issue

The U.S. Congress has tasked the National Ocean Research Leadership Council, a multi-agency body, to develop plans for a nationwide coastal ocean observing system. Congress conceived the national system as a federation of linked regional systems, such as the Gulf of Maine Ocean Observing System (GOMOOS) and the Southeast Atlantic Coastal Ocean Observing System. These regional systems, involving coalitions of scientists and regulatory agencies that specialize in oceanography, instrumentation, and various related disciplines, will be part of the coastal component of the National Ocean Observing System. As stated in the Frosch report, titled *Toward a U.S. Plan for an Integrated, Sustained Ocean Observing System* (1999), a national, sustained, ocean-observing system will

- detect and forecast oceanic components of climate change
- facilitate safe and efficient marine operations
- ensure national security
- manage living resources for sustainable use
- conserve and restore degraded marine ecosystems
- mitigate natural hazards
- ensure public health

A regional and national Ocean Observations system is now possible because of new technologies that are available to measure, on a real-time basis, many parameters in the oceans (wind speed, temperature, wave height, pollutants, and so on) and on the Great Lakes. NOAA has taken the leadership in developing and implementing this effort. Much of the current implementation is on a regional basis. It is felt that a broader distribution would be valuable. Sea Grant Extension's role will be to identify users of this new technology, to let potential users know what can be available to them, and to determine whether the technology can be modified to meet additional needs identified by users.

Sea Grant Experience

Much of the information that will be made available by the national ocean observing systems cannot be realized through traditional monitoring and research programs. Without coordination and outreach, the abundance of information, arriving in unfamiliar formats, could pose technical problems for managers and data users. Sea Grant outreach efforts can ensure that the data being collected and the information being transmitted are as useful as possible. This high-tech network can be cost effective as Sea Grant currently provides connections to user groups, assists with the development of effective information transfer tools, and provides support in the assessment and evaluation of the ocean observing system. Sea Grant brings diverse user groups from all coastal areas and sectors to the table. In addition, many Sea Grant programs are currently connected to university and agency partners that have formed ocean observing systems. Whereas some of these relationships have been based primarily in the research community, future projects can use Sea Grant outreach to enhance the effectiveness of these research partnerships.

Objectives and Outcomes

Sea Grant outreach can support the national ocean-observing systems in the local regions of the United States while using its national presence to help to ensure national connectivity with the data display and information transfer from the system. Together, the ocean observing systems, Sea Grant, and other constituents will

- plan cohesively to ensure that all sectors of coastal constituencies are considered in the selection of monitoring and observing parameters
- ensure that data and information from these systems are in accessible formats and distributed appropriately
- facilitate workshops, seminars, and forums to ensure that the data users understand the technical issues, analytical tools, and information derived from the ocean observing system
- assist with the future developments of the system by helping to evaluate the system and its products in the context of the user group's requirements and ability to access and use the information
- identify and recruit new data users as new technologies are developed and deployed to enhance the overall utility of the system
- provide linkages to formal and informal education partners to provide community visibility to the ocean observing system and facilitate the use of this system as a learning tool

The expected outcomes are a more effective feedback loop from constituents to the scientific community and effective use of funds already appropriated by policymakers.

Benefits to Nation

Partnership between Sea Grant outreach and the many national ocean-observing systems will provide to the nation

- improved return on the public investment in the ocean observing system
- enhanced use of the information gathered by the ocean observing system
- improved awareness of nearshore ocean processes as they relate to coastal users

Implementation Needs

Linking stakeholders and technology requires intensive outreach as it involves data collection and possibly behavior modification on the basis of study results. Each Sea Grant program will need about \$150,000 annually to cover personnel, technology training, and outreach activities (approximately \$4.5 million total). Exact figures depend on the eventual plan of work. As the outreach program achieves some success, additional research dollars may be sought to sustain the dedication and interest in the ocean stimulated among stakeholders.

